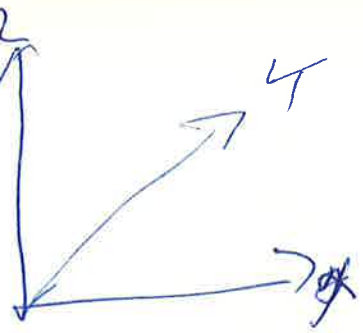

$\pi 4^2 =$

$-i\sigma_y)\sigma_z \frac{1}{\sqrt{2}}(1+i\sigma_y) = \sigma_z$.

$2i\partial x$.

$\left(\sigma_z - i(\sigma_y\sigma_z - \sigma_z\sigma_y) + \sigma_y\sigma_z\sigma_y\right)$

$\left(\sigma_z - 2i^2\sigma_x + \sigma_y\sigma_z\sigma_y\right)$

σ_x. $+ \frac{1}{2}\left(\sigma_z + \frac{\sigma_y\sigma_z\sigma_y}{i\sigma_x}\right.$

$i^2\sigma_z$.

$2\sigma_{ij} =$

$\sigma_i n_i)\sigma_j(\sigma_k n_k)$

$n_i n_k(\sigma_i\sigma_j\sigma_k)$

~~$\sigma_{ij} =$~~

$\sigma_i\sigma_j = i\varepsilon_{ijk}\sigma_k + \delta_{ij}$

$\sigma_j\sigma_k = i\varepsilon_{jkl}\sigma_l\sigma_e + \delta_{ij}\sigma_e$

$= i\varepsilon_{ijk}(i\varepsilon_{kem}\sigma_m + \delta_{ke}) + \delta_{ij}\sigma_e$

$=$

lode

$\cancel{n_k \; i\,\varepsilon_{ijk}\,(i\,\varepsilon_k}$

$n_l \; i\,\varepsilon_{ijk}\,(i\,\varepsilon_{klm}\,\sigma_m)$

$+ \; i\, n_i n_l\, \varepsilon_{ijk}\, \delta_{kl} \quad + \; n_i n_l\, \delta_{ij}\, \sigma_l$

$- \; \varepsilon_{ijk}\, \varepsilon_{klm}\, n_i n_l\, \sigma_m$

$+ \; i\, \varepsilon_{ijl}\, n_i n_l \quad + \; n_j n_l\, \sigma_l$

$= 0$

$\frac{1}{2} \sin\theta \; [\sigma \cdot \hat{n}, \sigma_j]$

$2i\, \varepsilon_{ikj}\, \sigma_k \cdot n_i$

$\varepsilon_{ijk} \cdot \sigma_k n_i$

$\varepsilon_{ljk}\, \sigma_k n_l$

$\sin\theta \; \varepsilon_{ikj}\, n_i\, \sigma_k$

$\varepsilon_{lkj}\, n_l\, \sigma_k$

$\varepsilon_{lij}\, n_l\, \sigma_i$

$\varepsilon_{lji}\, \sigma_i n_l$

$= \varepsilon_{jil} \cdot \sigma_i n_l$

$n_{l=2}$

$\varepsilon_{312} \qquad \varepsilon_{132}$